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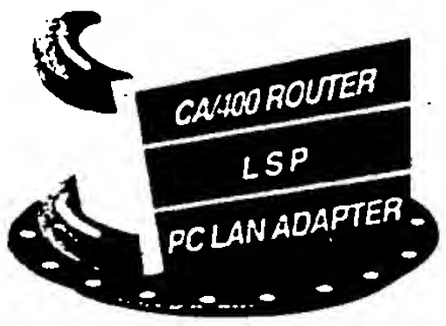

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Load 'n' Go Utilities

LOAD 'N' GO

Articles accompanied by this symbol contain complete utilities that you can obtain in several ways (see page 11 for details).

The Audit Bureau

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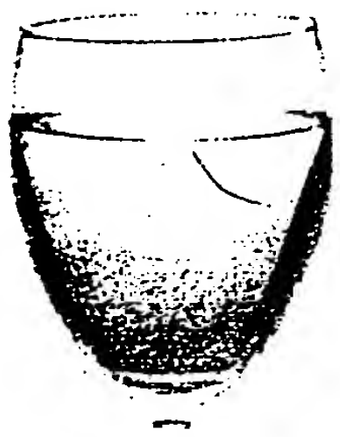

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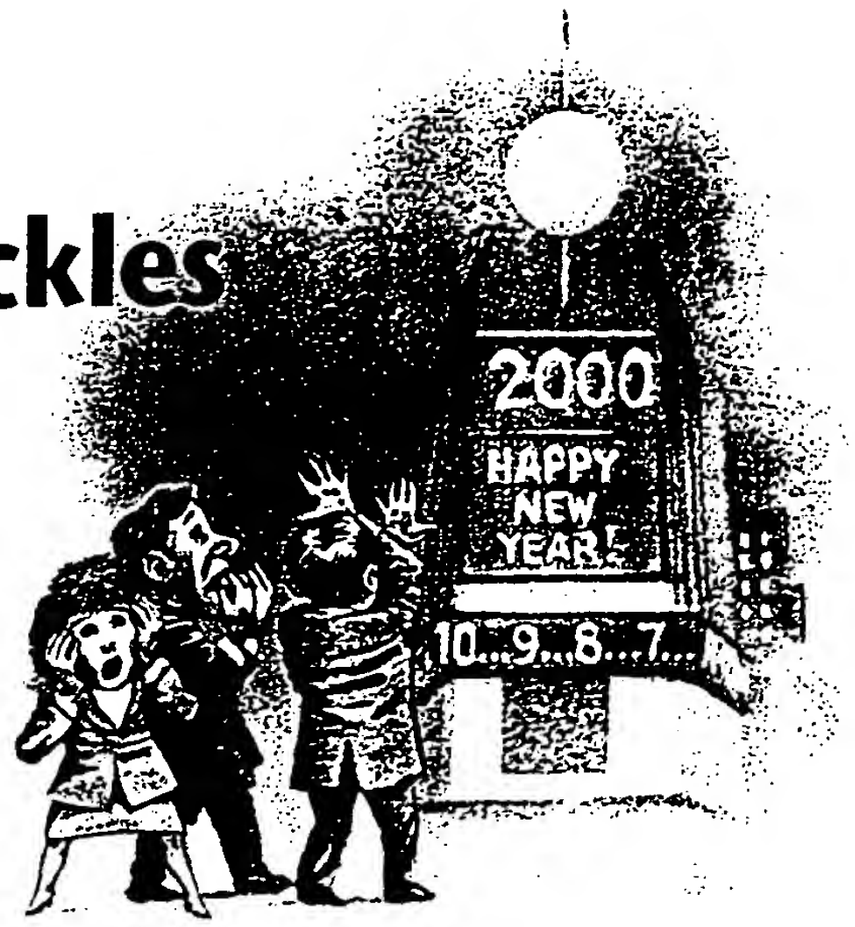
Newswatch

CAP Gemini Tackles the Year 2000



CAP Gemini America, New York-based technology consultants, and many midrange companies have entered countdown to potential doomsday: the year 2000.

Many computer applications — typically legacy-type programs written in Cobol, but others as well — can't process dates after January 1, 2000. Particularly hard hit will be programs that process dates as two-digit numbers, for example, storing the year 1999 as "99" and the year 2000 as "00." Because "00" is smaller than "99," the year 2000 is likely to appear as 1900.

To help companies find and correct the offending application code, CAP Gemini has unveiled a consulting program dubbed TransMillenium Services. CAP Gemini has adapted its AI-based migration systems software, originally designed to convert hierarchical databases to relational ones, to root out systems and application programs with this problem so that program code can be altered to reflect the correct post-2000 date.

CAP Gemini's Jim Woodward, senior vice president and head of the new program, says companies are going to spend a lot of money dealing with the year 2000. Citing figures from **ParaTechnology** consultants, Woodward estimates that U.S. companies could spend $90 billion to modify their applications to handle post-2000 dates. Other estimates, he adds, indicate price tags as high as $500 billion.

"Take an industry average of $.35 to $.40 per line of code," he says. "We have one client — a $200 million-a-year credit card company with 6,000 programs — that will pay $30 million to correct the year 2000 problem."

Woodward adds that companies are already feeling the impact. Some motor vehicle registries, for instance, have scaled back five-year licenses to four years because their computer systems go "tilt" at the "00" dilemma. Insurance companies are starting to feel the pinch as well, he adds. "We really do have credit card companies that can't issue five-year cards," he says.

Applications and programs that handle dates as a four-digit number are safe, explains Chris Rose, a technical solutions architect with the new CAP Gemini program. "There's no problem with SQL/400 and other four-digit data formats," Rose says. "But with any AS/400 programs written in Cobol/400, and even RPG programs, particularly older ones carried over from earlier mainframe and S/3X programs, there's likely to be a problem."

The most obvious fix, Rose adds, is to shift affected programs to a four-digit data format. Another common solution is to pick a cut-off point, say 1950, where any two-digit dates after that point (51, 52, so on) are treated as 20th century dates and any dates before that (01, 02, so on) are considered post-millennium dates.

The only problem with the latter option is, of course, you get to do it all over again in 55 years.

Steve Shaw
East Coast Editor

New Financing Options for S/36 Migration

In another effort to woo never-say-die S/36 owners, **IBM Credit Corporation** has unveiled a new financing program it hopes will make a dent in the market that seems immune to IBM's best marketing efforts.

As part of the new trade-in terms from IBM Credit, S/36s are worth a $1,500 credit, up from $500, toward the new AS/400 Advanced 36. Eligible S/36s include models 5360s, 5362s, 5363s, and 5364s.

Keith Flaugh, director of product financing strategy, adds that S/36 users with the highest credit ratings and who agree to a 36-month lease for the Advanced 36 are eligible for lease rates carrying 4.9 percent interest charges. Sixty-month leases are available at 6.9 percent interest. Customers with less than stellar credit ratings can expect to pay an additional three percentage points under the new lease program.

IBM telemarketers have called an undetermined number of S/36 users, alerting them to the new program. To be eligible, customers must order Advanced 36s by June 30.

As a further inducement for users to scrap their S/36s, IBM at the end of April hiked its rates for S/36 service contracts by 25 percent. "Many customers can acquire the Advanced 36 at a monthly cost less than the monthly maintenance costs and environmental expenses," Flaugh notes. Service contract increases have pushed typical contracts to between $100 and $300 a month, he adds.

In announcing the new lease program, John Callies, IBM Credit's general manager for end-user financing, said that the 200,000 or so S/36 hold-outs "have not kept pace with recent technology improvements and suggested enhancements," adding that the program is part of IBM Credit's ongoing efforts "to listen and respond to customers' requirements."

Steve Shaw
East Coast Editor

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Subject: Re: Year 2000
Date: 04/24/1995
Author: David C. DeForest <deforest@defcal.ultranet.com>
Posting History

In article <3n5gb9$lq9@chardonnay.niagara.com> Charles Kinghorn, charking@niagara.com writes:
>From: Charles Kinghorn, charking@niagara.com
>Subject: Year 2000
>Date: 20 Apr 1995 11:25:29 GMT

>Does anyone have experience yet with the maintenance of existing programs in
> preparation for the year 2000? ...

My solution was a flat out file convertion with the simple if statement for the date.

```
01  DATE.
    05  CC     PIC 9(2)
    05  YY    PIC 9(2)
    05  MM    PIC 9(2)
    05  DD    PIC 9(2)


 IF YY > 50
    MOVE 19  TO CC
 ELSE
    MOVE 20  TO CC.
```

This may not be the best solution but it works. I'll worry about the problem this little algorithim causes in 2020.

D.C. DeForest
deforest@defcal.ultranet.com

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* (72) Inventor:
SAKA NOBUO

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YEAR AND DATE KEY MANAGING METHOD FOR DATA FILE

* (57) Abstract:

PURPOSE: To provide the managing method for a year and date key being useful for processing a data file in which the year and date keys of both the years are mixed especially in the case the Christian Era year is transferred from the 1900 year level to the 200 year level, with regard to the managing method for the year and date key in a data processing system for processing the data file having the year and date key of an abbreviated form in which the upper two digits of the Chastian Era year are omitted.

CONSTITUTION: When a key file 3 of a year and date key is prepared with regard to a data file 1, or data are sorted by using the year and date key, year data in the year and date key is compared with a prescribed threshold, and based on its result, a value of two digits 19 or 20 is added to the higher coder of the year data, and the year data are restored to the Christian Era year of four digits. By the year and date key containing this restored year data, the key file 3 is prepared or the data is sorted.

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審査請求　未請求　請求項の数１(全　４　頁)

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(74)代理人　弁理士　長谷川　文廣　（外２名）

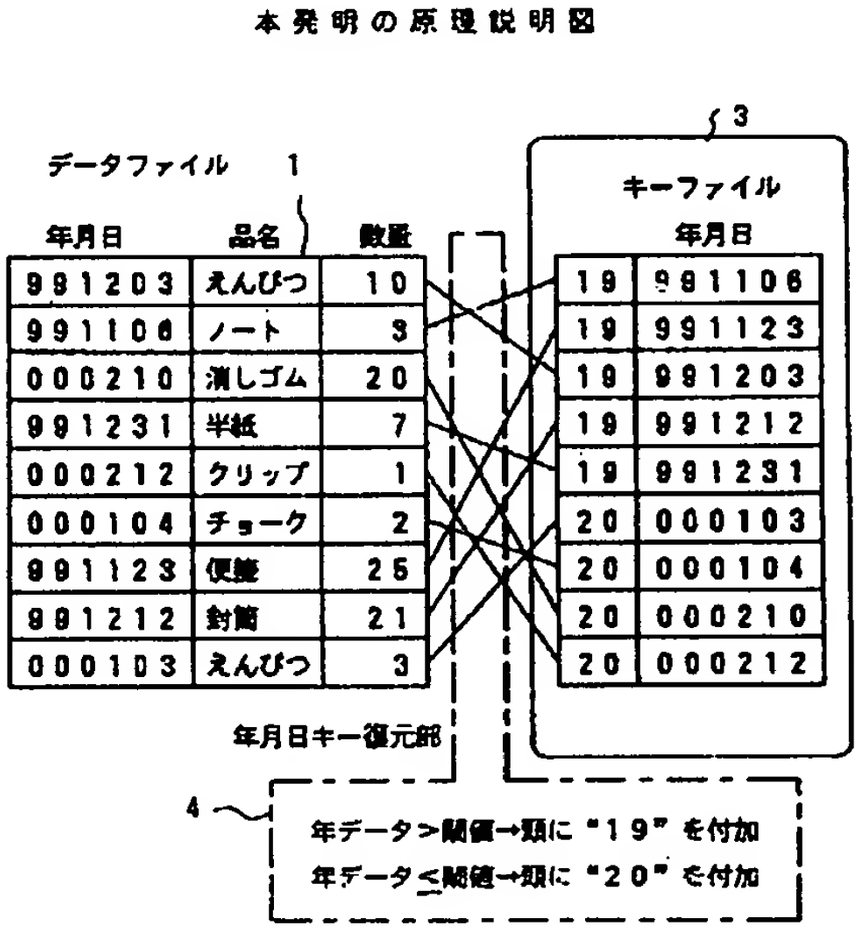
(54)【発明の名称】　データファイルの年月日キー管理方法

(57)【要約】

【目的】　西暦年の上位２桁を省略した短縮形の年月日キーをもつデータファイルを処理するデータ処理システムにおける年月日キーの管理方法に関するものであり，特に西暦年が１９００年台から２０００年台に移行した場合に，双方の年台の年月日キーが混在しているデータファイルを処理するために有用な年月日キーの管理方法を提供することを目的としている。

【構成】　データファイルについて年月日キーのキーファイルを作成，あるいは年月日キーを用いてデータのソートを行う際，年月日キー中の年データを所定の閾値と比較し，その結果に基づいて年データの上位に２桁の値１９あるいは２０を付加して年データを４桁の西暦年に復元し，この復元された年データを含む年月日キーにより，キーファイルの作成あるいはデータのソートを行わせる構成をもつ。

本発明の原理説明図



1

【特許請求の範囲】

【請求項1】　西暦年の上位2桁を省略し下位2桁のみを年月日キーの年データに用いるデータファイルを備えたデータ処理システムにおいて，上記データファイルについて年月日キーのキーファイルを作成，あるいは年月日キーを用いてデータのソートを行う際，年月日キー中の年データを所定の閾値と比較し，その結果に基づいて年データの上位に2桁の値19あるいは20を付加して年データを4桁の西暦年に復元し，この復元された年データを含む年月日キーにより，キーファイルの作成あるいはデータのソートを行わせることを特徴とするデータファイルの年月日キー管理方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は，西暦年の上位2桁を省略した短縮形の年月日キーをもつデータファイルを処理するデータ処理システムにおける年月日キーの管理方法に関するものであり，特に西暦年が1900年台から2000年台に移行した場合に，双方の年台の年月日キーが混在しているデータファイルを処理するために有用な年月日キーの管理方法を提供するものである。

【0002】

【従来の技術】通常，ファイル上で年月日データを管理する場合に，年については西暦年の上位2桁を省略した短縮形が用いられている。これは現在までのところ西暦年の上位2桁の値は“19”であって不変であるため，データが冗長になるからである。しかし西暦2000年を越えてデータを管理する状況になると，短縮形の年データは“00”となり，年月日をキーとする処理を行った場合，データの配列順序に不都合が生じる。

【0003】図3に従来例を示す。図において，1は，商品管理のデータファイルであり，各レコードは，購入日を示す年月日データと，品名データ，数量データからなる。年月日データは，たとえば“991203”は1999年12月3日を表わし，“000210”は2000年2月10日を表わす。このデータファイル1内のレコードの配列は，キーとなる年月日データの値に関してランダムになっている。2は，データファイル1の各レコードの年月日データについて作成したキーファイルであり，各年月日データが，値の大きさにしたがって配列されている。

【0004】この従来例のキーファイル2では，年月日データの最上位2桁の値が“00”のキーが“99”のキーに先行して配列されるため，境界で時系列上の逆転が生じ，具合が悪いものとなっている。一般に年月日データをソートする場合には，このような問題が生じる。

【0005】

【発明が解決しようとする課題】本発明は，西暦年の下位2桁を用いてキーとなる年月日データを構成しているデータファイルにおいて，西暦年が2000年を越えても，データファイルを変更する必要なしに時系列の逆転のないキーファイルの作成を可能にすることを目的としている。

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【0006】

【課題を解決するための手段】本発明の年月日キー管理方法は，西暦年の下位2桁を年データとしているデータファイルにおいて年月日をキーとしてキーファイルを作成あるいはソートを行う際に，年データの2桁の値が西暦1900年台と西暦2000年台のいずれに属するものであるかを判定して，その結果に基づいて2桁の年データの頭に2桁の値“19”または“20”を付加して拡張し，4桁の西暦年に復元して，この復元した西暦年を含む年月日データによりキーファイルの作成あるいはソートを行うようにするものである。

【0007】この本発明による年月日キーの管理方法は，データファイルの2桁の年データについて，西暦1900年台のものの値の範囲と西暦2000年台のものの値の範囲とが通常は明確に分れており，適当な閾値を用いることによりそれぞれの値の範囲を容易に切り分けできることを原理としている。

【0008】図1は本発明の原理説明図である。図において，1は，データファイルであり，その各レコードは西暦年の下位2桁を年データとして含む年月日キーをもつ。

【0009】3は，キーファイルであり，年月日キー復元部4により復元された4桁の西暦年データを含む年月日キーを用いて作成されたものである。4は，年月日キー復元部であり，年データの2桁の値を所定の閾値と比較して，年データが閾値よりも大きい場合には頭に“19”を付加し，年データが閾値よりも小さい場合には頭に“20”を付加して，4桁の西暦年データを含む年月日キーを復元する。

【0010】

【作用】図1を用いて本発明の作用を説明する。図1のデータファイル1に例示されている各レコードの年月日データ（キー）は，頭の2桁が“99”か“00”である。このことは，対応する西暦年が1999年か2000年であることを意味する。これは，データファイル1には2099年のデータや1900年のデータが存在しないことが裏付けとなっている。この場合，閾値として“99”と“00”の中間の任意の値を使用し，年月日キー中の年データと比較することによって，年月日キーが1999年に属するか2000年に属するかを簡単に識別することができる。たとえば閾値を“50”に設定し，年データが“50”よりも大きい“99”であれば頭に“19”を付加し，また年データが“50”よりも小さい“00”であれば頭に“20”を付加すればよい。

【0011】一般に，1900年台の年データの最小値が“n_0 n_1”であり，2000年台の年データの最大

3

値が“n_2 n_3”であれば，閾値には“n_0 n_1”と“n_2n_3”の間の適当な値が使用される。

【0012】このようにして復元された4桁の西暦年データをもつ年月日キーの値は時系列を正しく反映できるものとなるので，そのソートにより作成されるキーファイル3の各年月日キーは，図示のように時系列的に整列されたものとなる。

【0013】

【実施例】図2に，本発明実施例によるデータ処理システムの構成を示す。図2において，データファイル1，キーファイル3，年月日キー復元部4，はそれぞれ図1で説明したものと同じである。また5はキーファイル作成部であり，年月日キー復元部4により復元された年月日キーに基づいてキーファイル3を作成する。6，7，8，9はシステムのハードウェア構成を示し，6は処理装置，7はディスプレイ，8はキー入力装置，9はプリンタである。

【0014】年月日キー復元部4およびキーファイル作成部5の機能は，プログラムにより実現される。図示の例では，キーファイル作成部5は年月日キー復元部4に縦続的に接続され，年月日キー復元部4がデータファイル1から読み出し復元した年月日キーを受け取ってキーファイル3を作成する構成となっているが，キーファイル作成部5がデータファイル1から年月日キーを読み出し，年月日キー復元部4を呼び出して復元処理を依頼するように構成してもよく，またキーファイル作成部5が年月日キー復元部4の機能を内部に取り込んだ構成とすることも可能である。さらに年月日キー復元部の機能をもつプログラムをサポートプログラムとしてシステム側が備えていても，あるいはアプリケーションプログラム側が用意するようにしてもよい。

【0015】図2の構成では，年月日キー復元部4は次のように動作する。まずデータファイル1から1つのレコードを取り出し，その年月日キー中の2桁の年データ（nn）を読む。次に年データ（nn）を予め設定されている閾値（α）と比較し，nn＞αであれば年データ（nn）の頭に“19”を付加し，その他の場合には“20”を付加する。このようにして4桁の年データに復元し，残りの月日データと合成してキーファイル作成部5に渡す。これらの処理をデータファイル1の順次のレコードについて実行し，最終レコードまで処理したときに終了する。

4

【0016】キーファイル作成部5は，年月日キー復元部4から受け取った全ての年月日キーを図示されていないメモリの作業領域に書き込んで，重複するキーを除き，ソート処理を行って，たとえば昇順に配列したキーファイル3を作成する。

【0017】本発明はキーファイルの作成を例に説明されたが，これに限定されるものではなく，年月日キーのソートを伴う任意のファイル処理に適用されることができる。

【0018】

【発明の効果】本発明によれば西暦1900年台で使用した既存のファイルやアプリケーションを変更することなく西暦2000年台まで連続して運用することが可能となり，切替えに必要な保守費用を大幅に削減することができる。

【図面の簡単な説明】

【図1】本発明の原理説明図である。

【図2】本発明実施例によるデータ処理システムの構成図である。

【図3】従来例の年月日キー管理方法の説明図である。

【符号の説明】

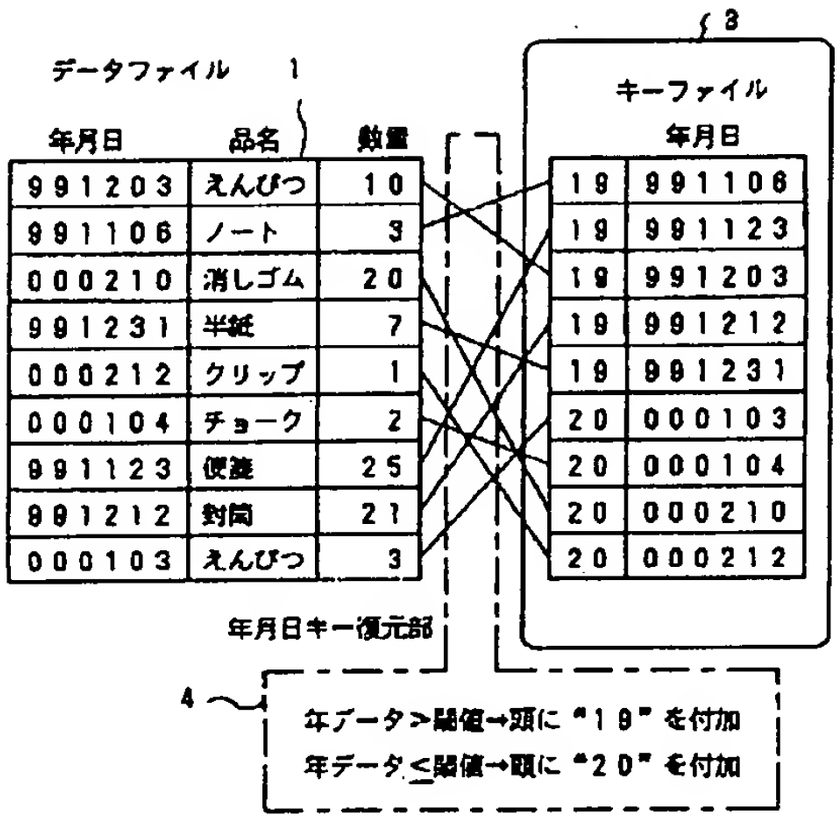
1　データファイル

3　キーファイル

4　年月日キー復元部

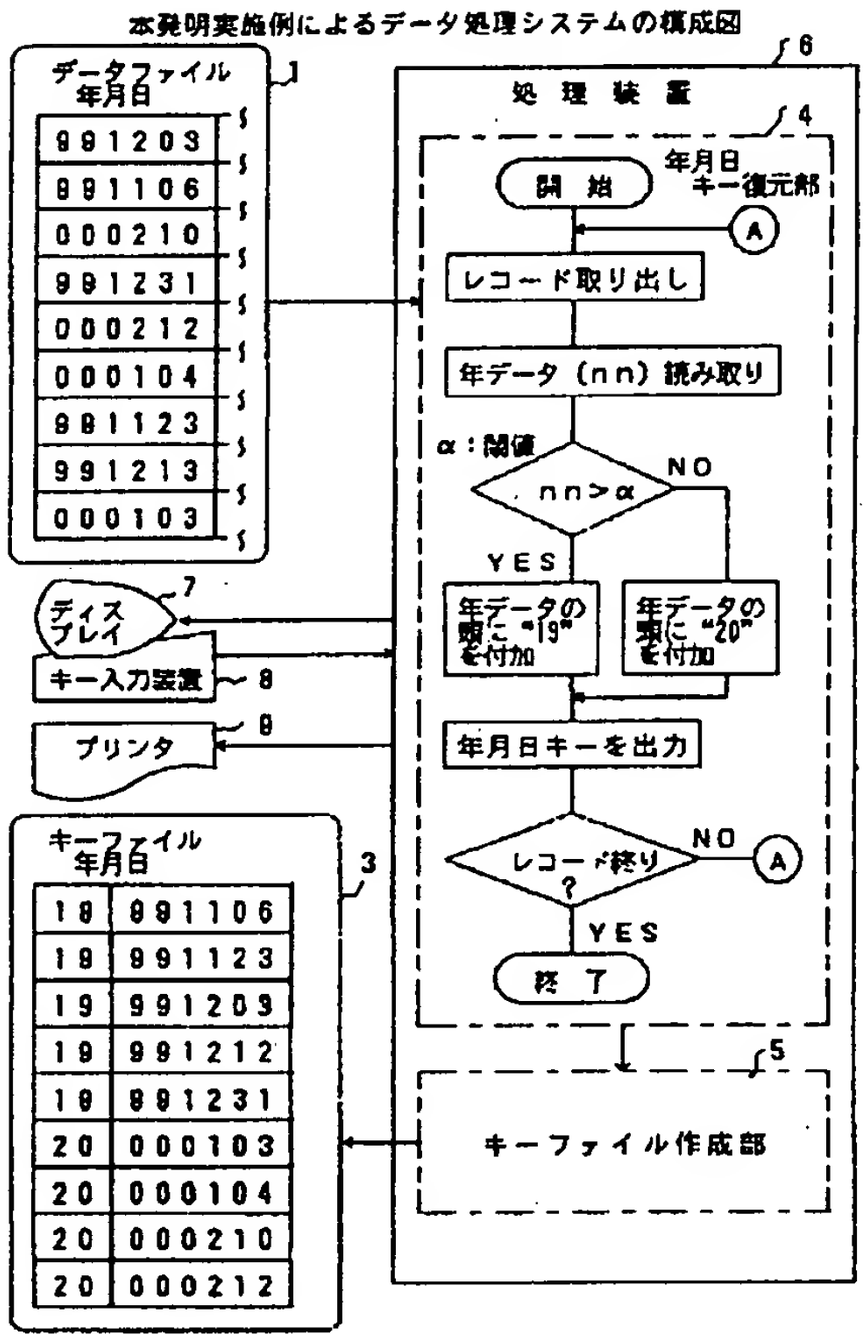
【図1】

本発明の原理説明図



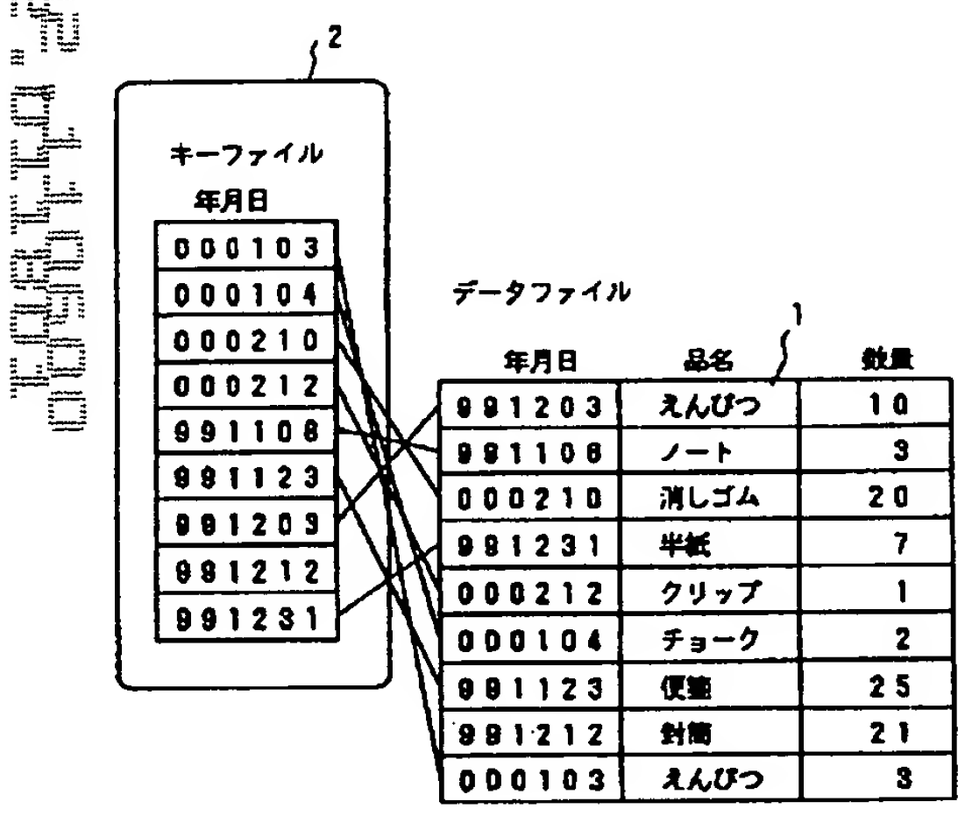
【図2】

本発明実施例によるデータ処理システムの構成図



【図3】

年月日キー管理方法の従来例の説明図



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(54) [Title of the Invention] Method of managing date keys of a data file

(57) [Abstract]

[Object] This relates to a method of managing date keys in a data processing system in which a data file is processed having a date key of abbreviated type omitting the two most significant digits of the western calendar year; in particular, its object is to provide a date key management method which is useful in processing a data file in which, when moving from the 20th century to the 21st century of the western calendar year, dates of both centuries are intermingled.

[Constitution] It has an arrangement wherein, when compiling a key file of date keys for a data file or when performing sorting of data using a date key, the year data in the date key is compared with a prescribed threshold value and, depending on the result, the 2-digit value 19 or 20 is appended at the head of the year data to restore the year data to the 4-digit western calendar year, and key file compilation or data sorting is performed by means of a date key including this restored year data.

Diagram of the principles of the invention

Data file 1

Date	Product name	Numerical quantity
991203	Pencil	10
991106	Notepad	3
000210	Eraser	20
991231	Rice paper	7
000212	Clipboard	1
000104	Chalk	2
991123	Writing paper	25
991212	Envelope	21
000103	Pencil	3

Key file 3

	Date
19	991106
19	991123
19	991203
19	991212
19	991231
20	000103
20	000104
20	000210
20	000212

Date key restoration unit 4

Year data > threshold value → append "19" at the head

Year data ≤ threshold value → append "20" at the head

[Claims]

[Claim 1] Method of managing date keys of a data file characterised in that in a data processing system comprising a data file in which only the least significant two digits, omitting the most significant two digits of the western calendar date are employed for the year data of the date key, when compiling a key file of date keys for said data file or when performing sorting of data using a date key, the year data in the date key is compared with a prescribed threshold value and, depending on the result,

the 2-digit value 19 or 20 is appended at the head of the year data to restore the year data to the 4-digit western calendar year, and key file compilation or data sorting is performed by means of a date key including this restored year data.

[Detailed description of the invention]

[0001]

[Field of Industrial Application] The invention relates to a method of managing a date key in a data processing system in which a data file is processed having an abbreviated date key in which the most significant two digits of the year in the western calendar are omitted. In particular, it provides a method of managing a date key which is useful for processing a data file in which, when the year in the western calendar shifts from the 20th century to the 21st century, date keys of both centuries are intermingled.

[0002]

[Prior art] Usually, when managing date data in a file, an abbreviated form is employed in which the most significant two digits of the year in the western calendar are omitted. This is because, at the present time, the value of the most significant two digits of the year in the western calendar is always "19", so the data is redundant. However, when the situation is reached in which data beyond the year 2000 in the western calendar are to be managed, the year data in abbreviated form becomes "00", so, when performing processing in which the date is used as key, inconvenience occurs in the order of arrangement of the data.

[0003] A prior art example is shown in Figure 3. In this Figure, 1 is a product management data file, in which each record comprises date data indicating date of purchase, product name data, and numerical quantity data. In the date data, for example "991203" represents 3rd December, 1999, and "000210" represents 10th February 2000. The arrangement of records within this data file 1 is random with respect to the value of the date data, which constitutes the key. 2 is a key file compiled for the date data of the records of data file 1, in which the date data are arranged in accordance with the magnitude of their value.

YYMMDD

[0004] In the key file 2 of this prior art example, keys in which the value of the most significant two digits of the date data is "00" are arranged prior to the keys in which this is "99", so, at the boundary, an inversion in time sequence occurs, which is inconvenient. In general, this problem occurs when date data are sorted.

[0005]

[Problem that the invention is intended to solve] An object of this invention, in a data file in which date data providing a key are constituted using the least significant two digits of the year of the western calendar, is to make possible the compilation of a key file in which there is no inversion of time sequence and no need for alteration of

the data file even if the year 2000 in the western calendar is exceeded.

[0006]

[Means for solving the problem] In a method of managing date keys according to the invention, when compiling a key file or performing sorting keyed by date in a data file in which the least significant two digits of the western calendar year are employed as the year data, it is ascertained whether the value of the two digits of the year data belongs to the 20th century or 21st century of the western calendar and, in accordance with the result, the 2-digit year data is expanded by appending at its head the 2-digit value "19" or "20", thereby restoring it to the 4-digit western calendar year, and compilation of a key file or sorting is performed using the year data including this restored western calendar year.

[0007] The principle of the method of managing a date key according to the invention is that, for 2-digit year data of a data file, normally the range of values of the 20th century of the western calendar and the range of values of the 21st century of the western calendar are clearly distinguished, so by employing a suitable threshold value, the respective value ranges can easily be separated.

[0008] Figure 1 is a diagram of the principles of the invention. In this Figure, 1 is a data file whose record data have a date key including as year data the least significant two digits of the year of the western calendar.

[0009] 3 is a key file which is compiled using a date key including the 4-digit western calendar year data restored by date key restoration unit 4. 4 is the date key restoration unit; this compares the 2-digit value of the year data with a prescribed threshold value and, if the year data is greater than the threshold value, appends "19" at the head thereof, and, if the year data is smaller than the threshold value, appends "20" at the head thereof, thereby restoring a date key including 4-digit western calendar year data.

[0010]

[Action] The action of this invention will be described using Figure 1. In the date data (keys) of each of the records shown by way of example in the data file 1 of Figure 1, the two head digits are "99" or "00". This indicates that the corresponding year of the western calendar is 1999 or 2000. The reason for this is that the data file 1 does not contain the year data "2099" or "1900". In this case, by employing an arbitrary value between "99" and "00" as the threshold value, and comparing this with the year data in the date keys, it is simple to identify whether a date key belongs to the year 1999 or the year 2000. For example, if the threshold value is set to "50", if the year data is "99", which is larger than "50", "19" is appended to the head thereof, or, if the year data is "00", which is smaller than "50","20" is appended to the head thereof.

[0011] In general, if the minimum value of the year data in the 20th century is

"$n_0\,n_1$", and the maximum value of the year data in the 21st century is "$n_2\,n_3$", for the threshold value, a suitable value between "$n_0\,n_1$" and "$n_2\,n_3$" is employed.

[0012] Since the values of year keys having 4-digit western calendar year data which are restored in this way now accurately reflect the time sequence, the date keys of a key file 3 compiled by sorting these are put in correct time sequence order as shown in the drawing.

[0013]

[Embodiments] Figure 2 shows the layout of a data processing system according to an embodiment of the invention. In Figure 2, data file 1, key file 3, and date key restoration unit 4 are respectively the same as those described with reference to Figure 1. Also, 5 is a key file compilation unit that compiles a key file 3 from the date keys restored by date key restoration unit 4. 6, 7, 8, and 9 indicate the hardware construction of the system, 6 being a processing device, 7 being a display, 8 being a key input device and 9 being a pripter.

[0014] The function of date restoration unit 4 and key file compilation unit 5 is realised by a program. In the example illustrated in the drawings, a layout is adopted whereby key file compilation unit 5 is cascade-connected to date key restoration unit 4, and key file 3 is compiled by receiving the date key restored by reading from data file 1 by date key restoration unit 4; however, a layout could be adopted in which key file compilation unit 5 reads the date key from data file 1 and relies on restoration processing performed by calling date key restoration unit 4, or a layout could be adopted in which key file compilation unit 5 incorporates the function of date key restoration unit 4 internally. Further, a program having the function of the date key restoration unit could be provided by the system as a support program, or could be prepared as an application program.

[0015] In the layout of Figure 2, the date key restoration unit 4 operates as follows. First of all, it gets one record from data file 1, and reads the 2-digit year data (n n) in the date key thereof. Then, it compares the year data (n n) with the previously set threshold value (α) and, if n n > α, it appends "19" to the head of the year data (n n); otherwise, it appends "20". In this way, it restores the 4-digit year data, and, combining this with the remaining month and day data, transfers it to key file compilation unit 5. This processing is executed for the successive records of data file 1 and terminates when the last record is processed.

[0016] Key file compilation unit 5 writes into a working region of memory, not shown, all the date keys that have been obtained from date key restoration unit 4 and compiles a key file 3 arranged for example in ascending order by performing sorting processing, eliminating duplicated keys.

[0017] Although this invention has been described taking as example the

compilation of a key file, it is not restricted to this and can be applied to any desired file processing involving sorting of a date key.

[0018]

[Benefit of the Invention] With this invention, it becomes possible to use existing files or applications used in the 20th century of the western calendar into the 21st century of the western calendar continuously without having to modify them, thereby making it possible to greatly reduce maintenance costs necessary for changeover.

[Brief description of the drawings]

[Figure 1] This is a diagram of the principles of the invention.

[Figure 2] This is a layout diagram of a data processing system according to an embodiment of the invention.

[Figure 3] This is a diagram of a method of date key management according to a prior art example.

[Explanation of the reference symbols]

1 data file

3 key file

4 date key restoration unit

Drawings

Figure 1

Diagram of the principles of the invention

Data file 1

Date	Product name	Numerical quantity
991203	Pencil	10
991106	Notepad	3
000210	Eraser	20
991231	Rice paper	7
000212	Clipboard	1
000104	Chalk	2
991123	Writing paper	25
991212	Envelope	21
000103	Pencil	3

Key file 3

	Date
19	991106
19	991123
19	991203
19	991212
19	991231
20	000103
20	000104
20	000210
20	000212

Date key restoration unit 4

Year data > threshold value → append "19" at the head

Year data ≤ threshold value → append "20" at the head

Figure 2

Layout of data processing system according to embodiment of the invention

1 Data file date

7 Display

8 Key input device

9 Printer

3 Key file date

6 Processing device

4 Date key restoration unit

Start

Get record

Read year data (n n)

α: threshold value

YES

append "19" at the head of the year data

NO

append "20" at the head of the year data

Output date key

Record ends?

End

5 Key file compilation unit

Figure 3

Diagram of prior art example of date key management system

2 key file

Date

Data file 1

Date	Product name	Numerical quantity
991203	Pencil	10
991106	Notepad	3
000210	Eraser	20
991231	Rice paper	7
000212	Clipboard	1
000104	Chalk	2
991123	Writing paper	25
991212	Envelope	21
000103	Pencil	3